Iowa Department of Natural Resources

Leading Iowans in caring for our natural resources

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Stream Water Quality Summary 2000-2016

Water Quality Parameter	Units	Number of Samples	Min Value	Percentiles					Max Value
				10th	25th	50th	75th	90th	
Acetochlor (4)	mg/L	8,627	<0.1	<0.1	<0.1	<0.1	<0.1	0.18	11
Alachlor (4)	mg/L	8,627	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2
Alkalinity, Total (5)	mg/L	889	55	160	190	240	280	310	460
Ammonia (as N)	mg/L	14,884	<0.1	<0.1	<0.1	<0.1	<0.1	0.16	5.7
Atrazine (4)	mg/L	8,627	<0.1	<0.1	<0.1	<0.1	<0.1	0.60	53
Butylate	mg/L	8,627	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (5)	mg/L	875	15	58	67	81	98	110	150
Carbonaceous BOD (5 day)	mg/L	14,638	<2	<2	<2	<2	<2	4	37
Chloride	mg/L	14,185	<1	11	16	21	28	39	180
Chlorophyll a (1)	mg/L	4,832	<1	<1	3	10	37	110	620
Chlorophyll b (1)	mg/L	4,828	<1	<1	<1	<1	<1	2	70
Chlorophyll c (1)	mg/L	4,787	<1	<1	<1	<1	2	9	66
Chlorophyll free of pheophytin	mg/L	10,011	<1	2	4	10	27	76	870
Corrected Chlorophyll a	mg/L	4,835	<1	2	5	13	43	123	640
Cyanazine (4)	mg/L	8,627	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.3
Deethylatrazine (4)	mg/L	8,627	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.54
Deisopropylatrazine (4)	mg/L	8,627	<0.1	<0.1	<0.1	<0.1	<0.1	0.14	2.6
Dimethenamid (4)	mg/L	6,794	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	3.8
Diss. Orthophosphate (as P)	mg/L	14,830	<0.1	<0.1	<0.1	<0.1	0.14	0.26	9.5
Dissolved Oxygen	mg/L	14,281	0.7	7.8	8.7	10.5	12.7	14.2	21
E.coli Bacteria	CFU/100 ml	14,869	<10	10	31	120	430	2,000	920,000
Field pH	pH units	14,997	5.0	7.7	8.0	8.2	8.4	8.5	10.9
Field Temperature	Celsius	15,057	0	0.1	2.0	12.1	20.1	24.2	34.3
Magnesium (5)	mg/L	875	2.9	14	21	26	33	37	68
Metolachlor (4)	mg/L	8,627	<0.1	<0.1	<0.1	<0.1	<0.1	0.30	23
Metribuzin (4)	mg/L	8,627	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.5
Nitrate+Nitrite (as N)	mg/L	15,064	<0.1	0.6	2.6	5.5	8.2	11	39
Organic Carbon, Dissolved (5)	mg/L	878	<0.5	1.5	2.0	2.7	3.5	5	11
Organic Carbon, Total	mg/L	6,060	<0.5	2.5	3.5	5.1	7.8	12	260
Pheophytin (1)	mg/L	4,828	<1	<1	1	3	8	18	204
Potassium (5)	mg/L	874	<1	1.6	2.0	2.7	3.6	5.3	17
Silica (2)	mg/L	8,203	<1	4.9	8.9	13	17	21	190
Simazine (4)	mg/L	8,618	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	20
Sodium (5)	mg/L	875	1.8	6.1	7.7	9.9	12	16	69
Specific Conductance (3)	µmhos/cm	8,374	120	420	510	620	720	830	1,700
Sulfate	mg/L	13,886	<1	19	24	34	58	97	410
Total Dissolved Solids	mg/L	14,880	100	260	300	360	430	510	3,980
Total Hardness (as CaCO3)	mg/L	14,841	100	200	240	300	360	410	820
Total Kjeldahl Nitrogen	mg/L	14,882	<0.1	0.20	0.43	0.70	1.1	1.8	28
Total Phosphorus	mg/L	14,879	<0.1	<0.1	0.11	0.19	0.32	0.53	26
Total Volatile Suspended Solids	mg/L	9,085	<1	1	3	7	16	30	2,100
Total Suspended Solids	mg/L	14,884	<1	3	9	32	81	200	17,000
Trifluralin (4)	mg/L	8,627	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.35
Turbidity	NTU	14,831	<1	2.5	5.4	16	38	90	8,500

µg/L - micrograms per liter; mg/L - milligrams per liter; NTU - Nephelometric
CFU/100 ml - Colony Forming Units /100 milliliters of water; BOD - Biological Oxygen
µmhos/cm - micromhos per centimeter; < - less than detection limit shown; Diss. - Dissolved

Raw data are available through IASTORET at https://programs.iowadnr.gov/iastoret/

(1) Sampling discontinued in 2005; (2) Sampling discontinued in 2008; (3) Sampling discontinued in 2009; (4) Sampling suspended from Sep 2008 through May 2012; sampling resumed May 2012 through July 2014; (5) Sampling initiated September 2014

The number of stream sites sampled monthly during 2000 through 2016 varied from 58 to 84.

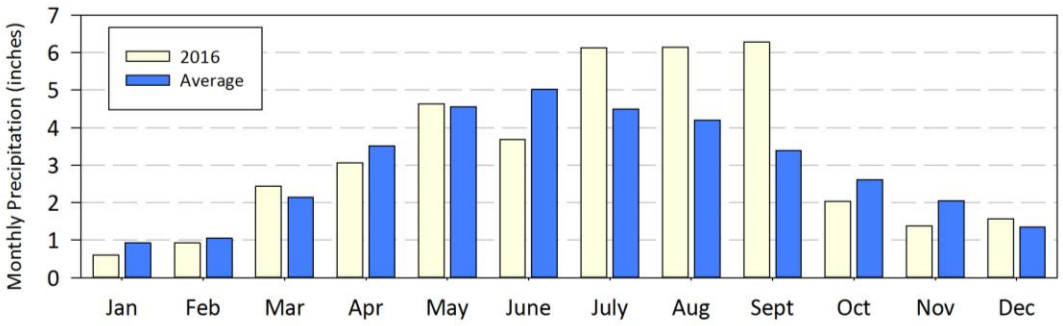

Figure 1. Monthly rainfall for 2016 compared to long-term monthly normal rainfall for Iowa. (Source of rainfall data – Harry Hillaker, State Climatologist, Iowa Department of Agriculture & Land Stewardship.)

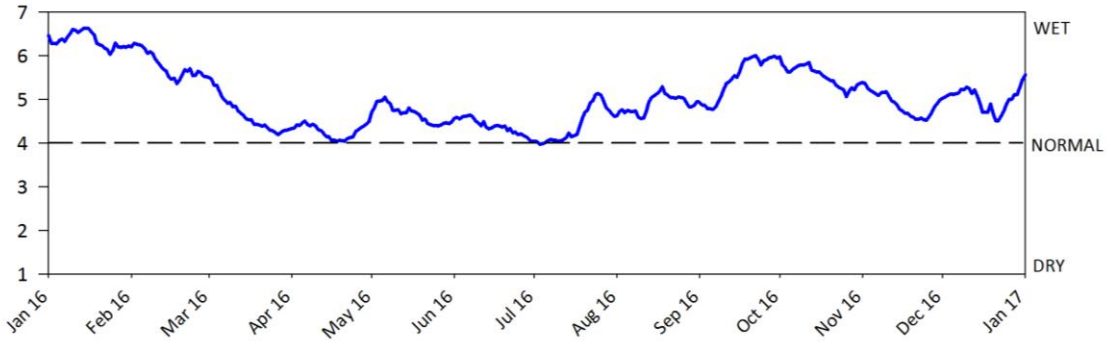

Figure 2. Iowa stream index for 2016. Index based on stream flow conditions at stream gages across Iowa compared to long-term normal conditions. (Source of stream index data - U.S. Geological Survey, 2017, USGS WaterWatch, accessed January 1, 2017, https://waterwatch.usgs.gov/.)

Figure 1 shows the monthly rainfall data for 2016 compared to the long-term monthly normal rainfall for Iowa. Rainfall for the first several months of 2016 was near normal. June rainfall fell below normal by 1.33 inches but was followed by significant rainfall in July through September, resulting in rainfall totals that were 6.5 inches above normal for those three months. Rainfall for the latter part of 2016 was below long-term monthly totals. Figure 2 illustrates the 2016 stream index for Iowa. Stream flow levels were high early in 2016 followed by near normal conditions through the spring and summer. Above normal rainfall for September caused the stream index to be above normal during September leading into October. During the months of November and December, the stream index declined to slightly above normal.

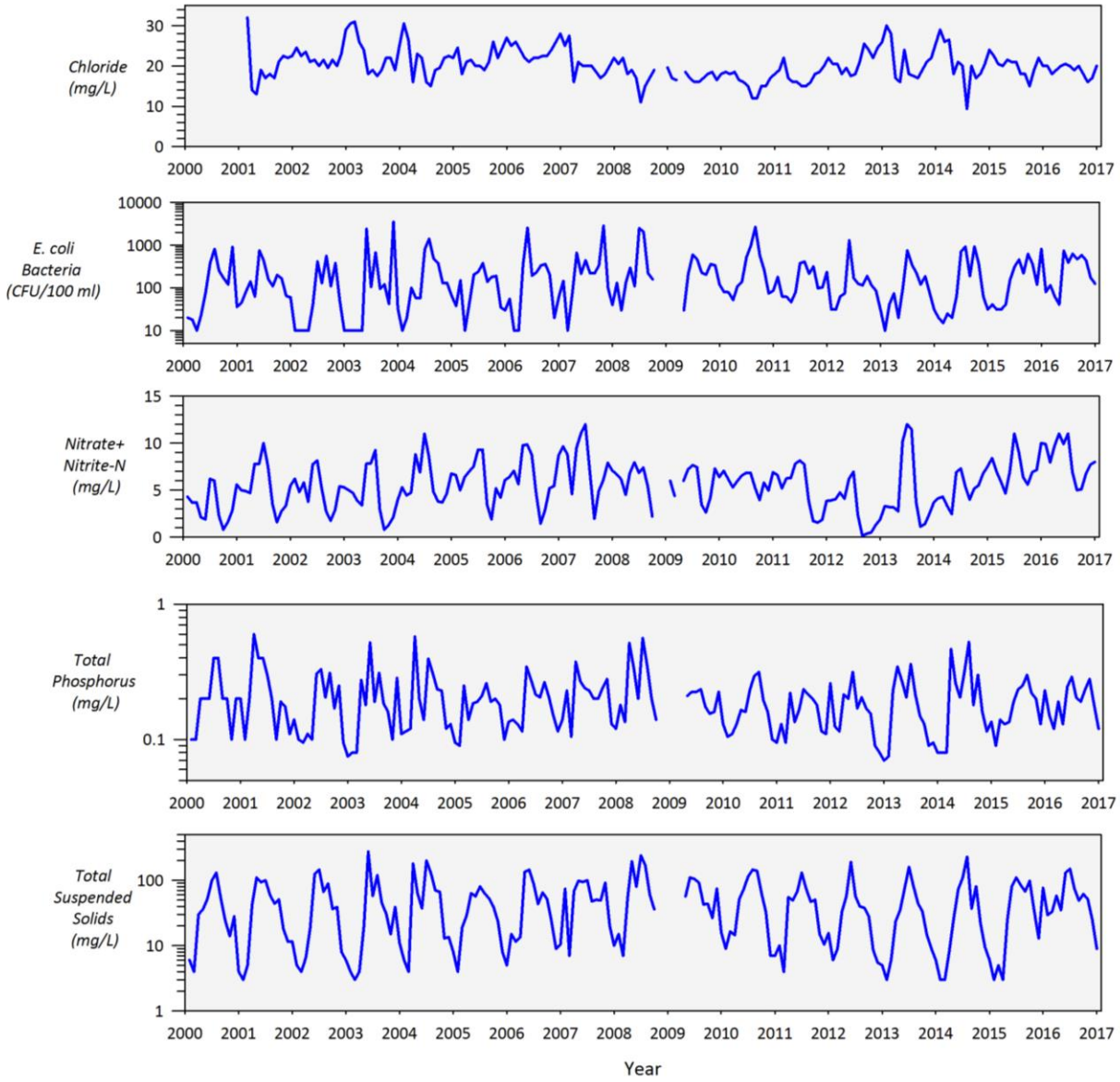

Figure 3. Median monthly concentrations for the 52 stream sites monitored all years from 2000 through 2016 as part of the DNR's Ambient Stream Monitoring Program. Note: Other stream sites have been monitored during those years but do not have 17 years of data. A gap in data occurred late 2008/early 2009 due to budget constraints.

Monthly median concentrations for several parameters varied both seasonally and yearly (Figure 3). Chloride concentrations were higher while *E. coli* bacteria, nitrate+nitrite-N, total phosphorus, and total suspended solids levels were lower during the winter months. Nitrate+nitrite-N concentrations were higher during the late spring/early summer. The impact of the drought year of 2012 was most noticeable with nitrate+nitrite-N, as some of the overall lowest concentrations occurred towards the end of 2012 followed by some of the highest concentrations once rain returned in 2013.

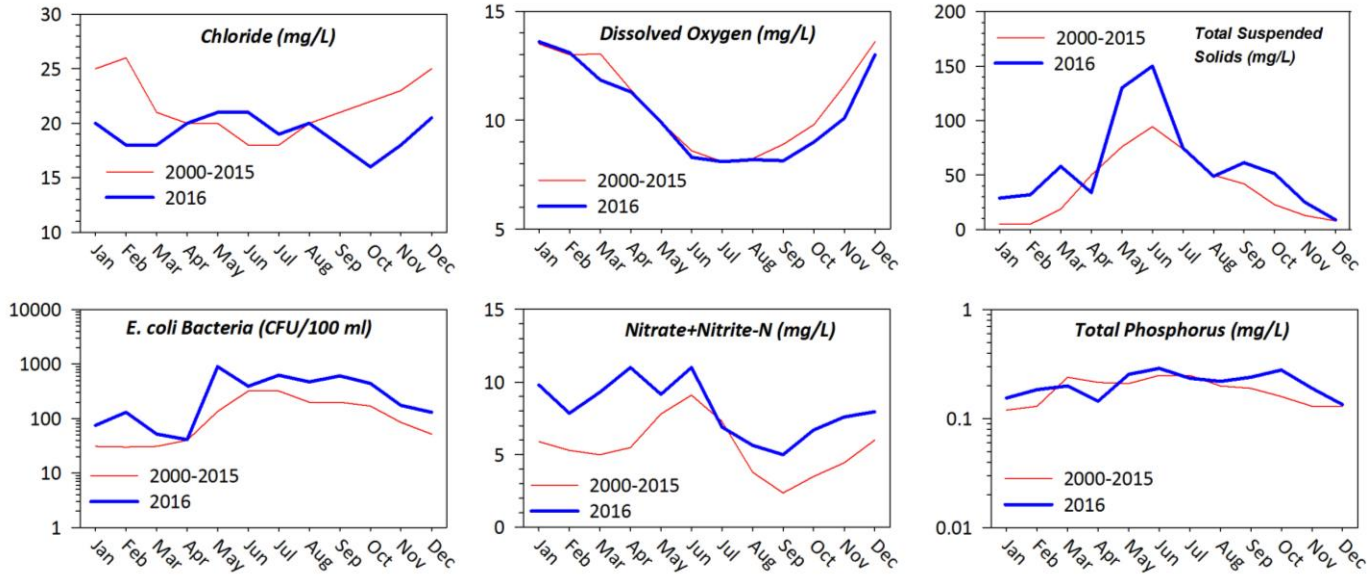

Figure 4. Monthly median concentrations for streams monitored statewide as part of the DNR's Ambient Stream Monitoring Program.

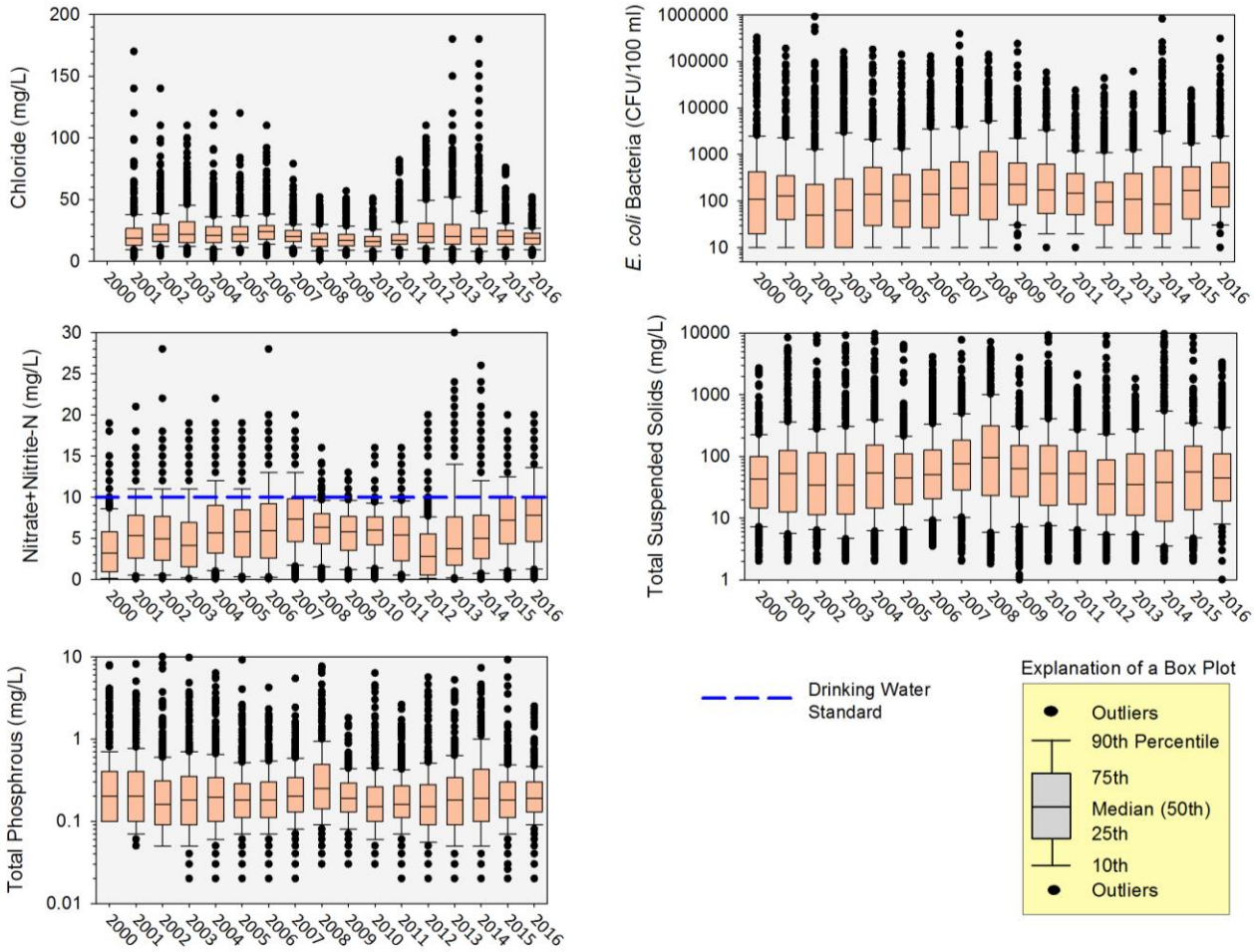

Figure 5. Box plots by year of data from 52 stream sites monitored all years from 2000 through 2016 as part of the DNR's Ambient Stream Monitoring Program. Note: Other stream sites have been monitored during those years but do not have 17 years of data.

Monthly median stream concentrations for 2016 followed patterns similar to those seen from 2000 through 2015 for *E. coli* bacteria, dissolved oxygen, and total phosphorus (Figure 4). Chloride during 2016 differed from the overall trend as it was lower during the non-summer months and above normal during the summer months. Nitrate+nitrite-N, *E. coli* bacteria, and total suspended solids concentrations were higher in 2016 compared to the 2000-2015 time period.

Figure 5 shows the variability in concentrations from year to year. Monitoring for chloride did not begin until 2001. Annual median chloride concentrations ranged from 16 to 22 mg/L; nitrate+nitrite-N from 2.8 to 7.8 mg/L; *E. coli* bacteria from 50 to 230 CFU/100 ml; total suspended solids from 34 to 96 mg/L; and total phosphorus from 0.15 to 0.25 mg/L. The drought year of 2012 resulted in lower concentrations overall for several of the parameters, including nitrate+nitrite-N*, E. coli* bacteria, total suspended solids, and total phosphorus.

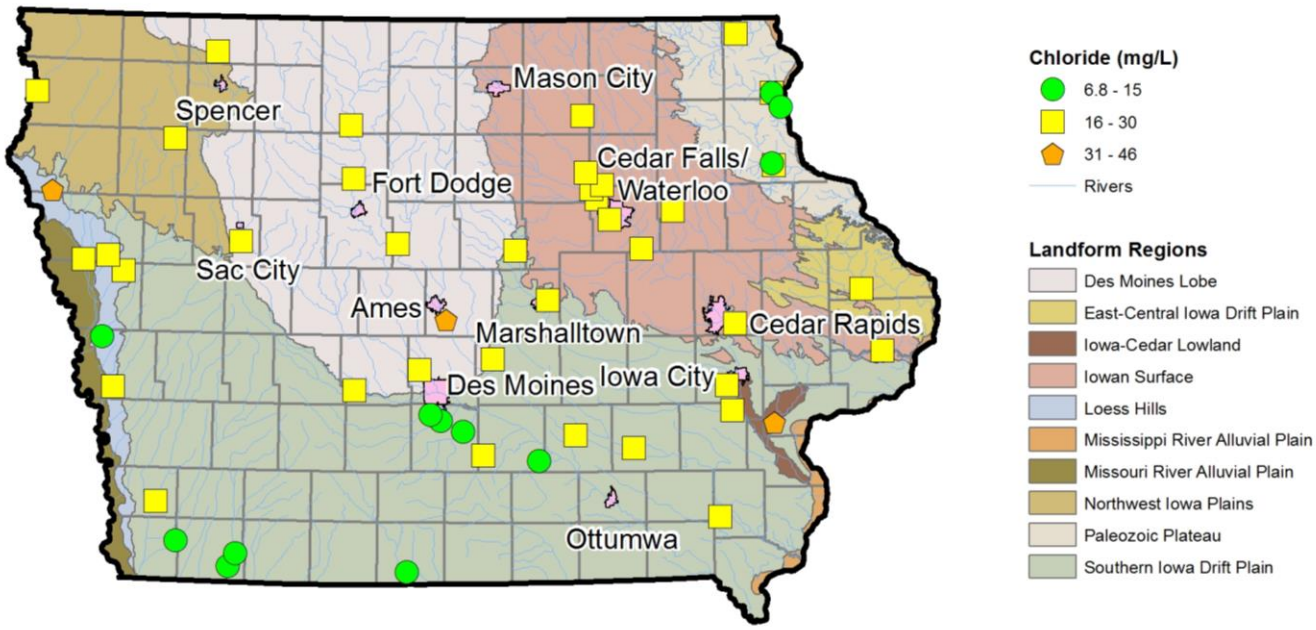

Figure 6. Median chloride concentrations for 52 stream sites monitored all years from 2000 through 2016 as part of the DNR's Ambient Stream Monitoring Program. Note: Other stream sites were monitored during those years but do not have 17 years of data.

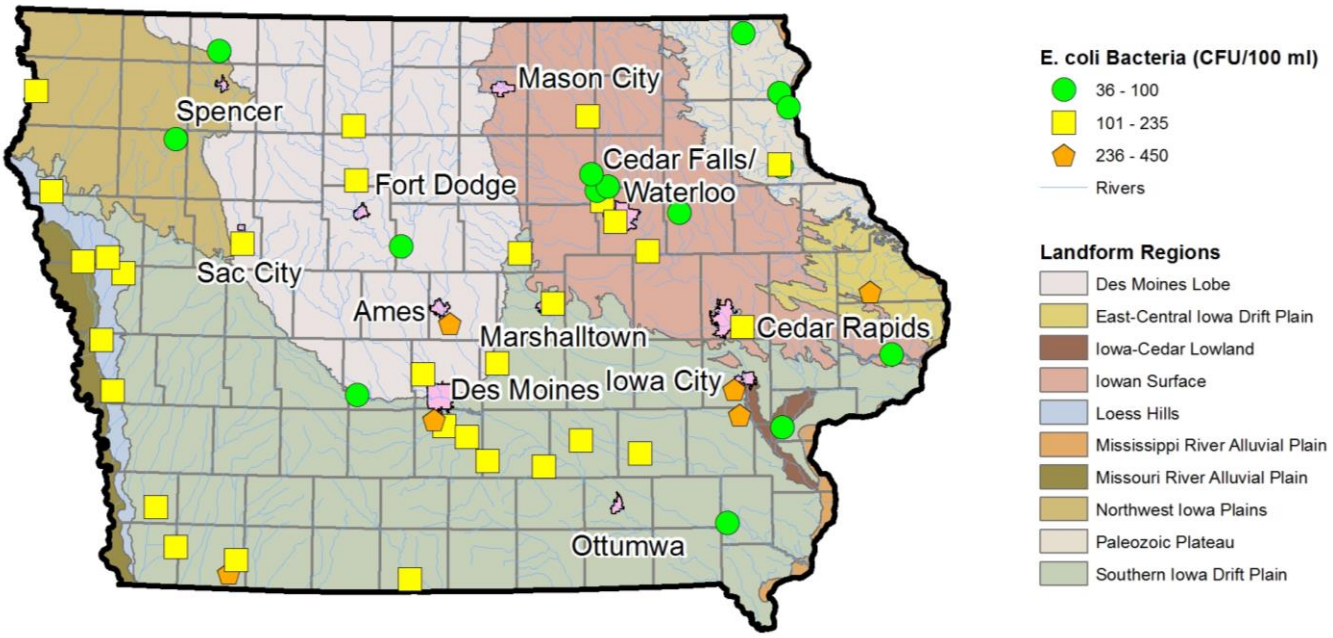

Figure 7. Median *E. coli* bacteria concentrations for 52 stream sites monitored all years from 2000 through 2016 as part of the DNR's Ambient Stream Monitoring Program. Note: Other stream sites were monitored during those years but do not have 17 years of data.

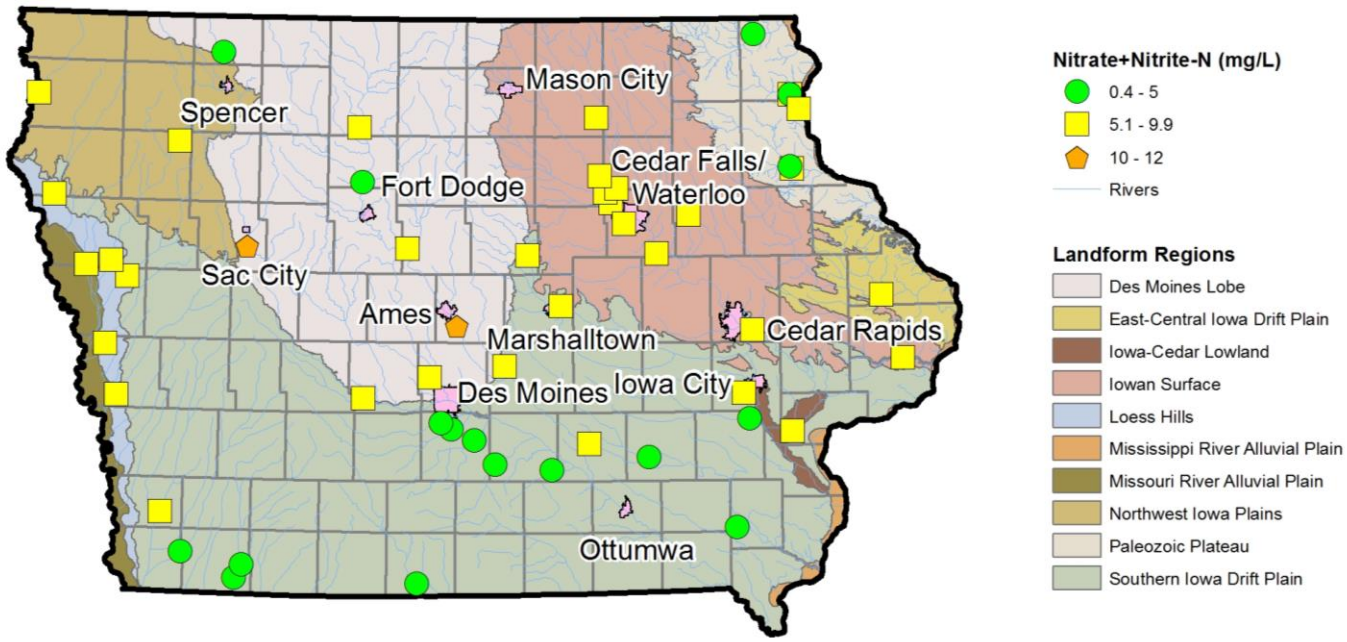

Figure 8. Median nitrate+nitrite-N concentrations for 52 stream sites monitored all years from 2000 through 2016 as part of the DNR's Ambient Stream Monitoring Program. Note: Other stream sites were monitored during those years but do not have 17 years of data.

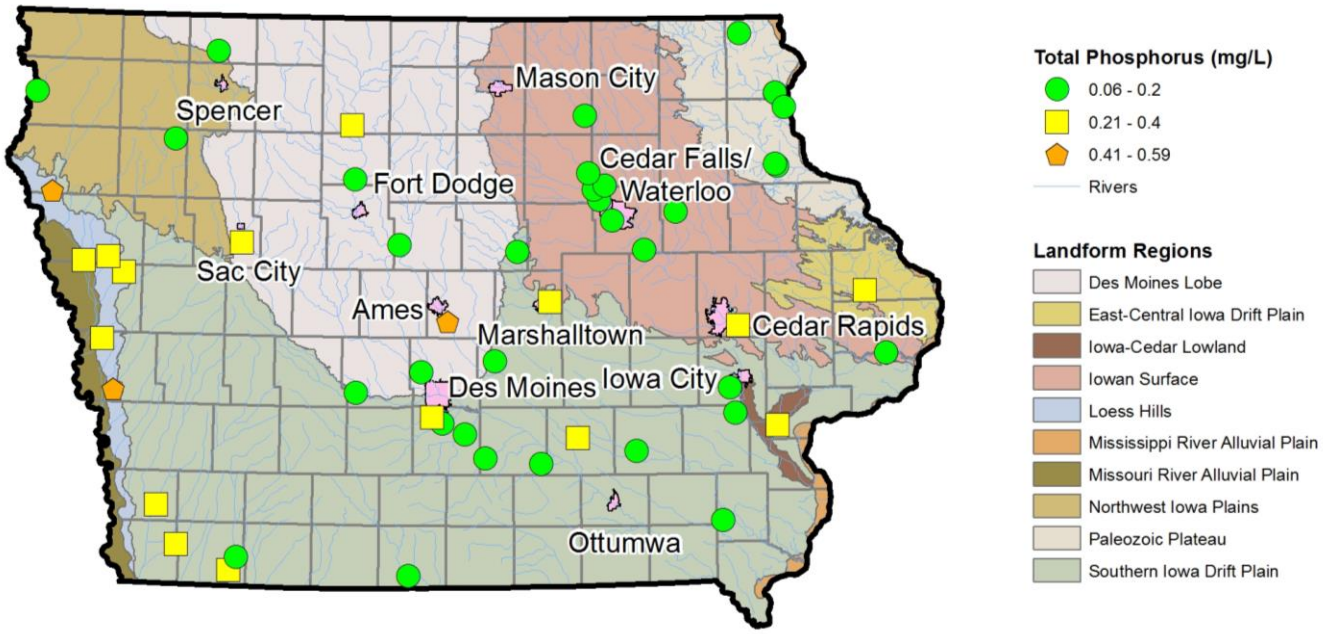

Figure 9. Median total phosphorus concentrations for the 52 stream sites monitored all years from 2000 through 2016 as part of the DNR's Ambient Stream Monitoring Program. Note: Other stream sites were monitored during those years but do not have 17 years of data.

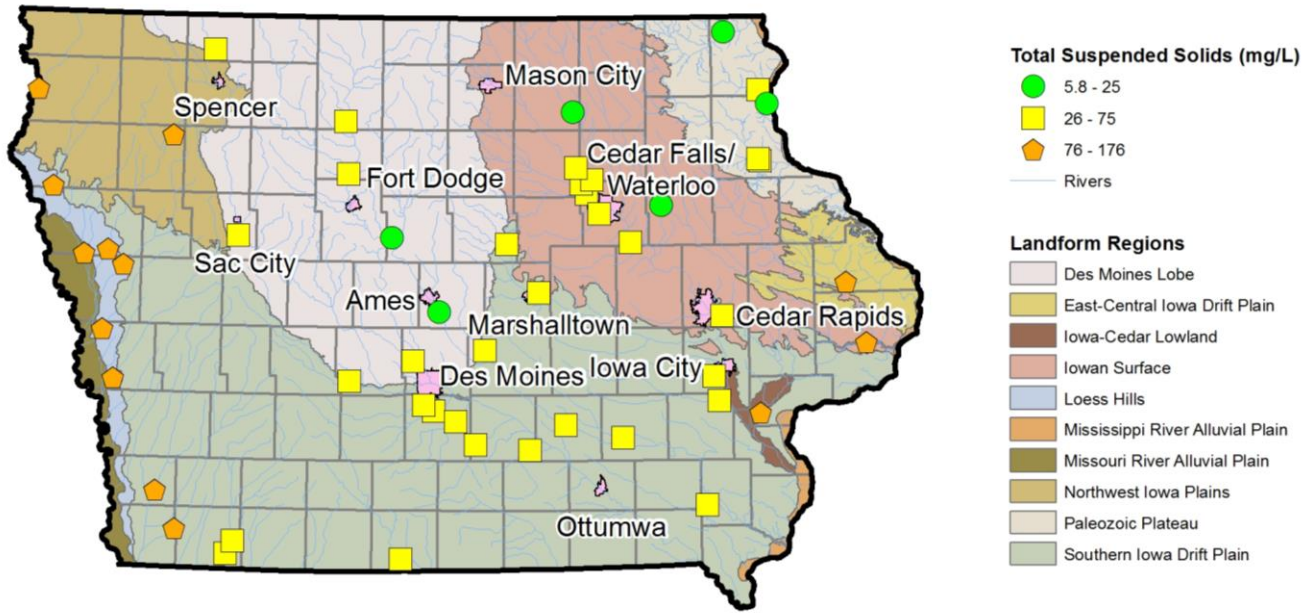

Figure 10. Median total suspended solids concentrations for the 52 stream sites monitored all years from 2000 through 2016 as part of the DNR's Ambient Stream Monitoring Program. Note: Other stream sites were monitored during those years but do not have 17 years of data.